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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/966,563	09/27/2001	Muhammad Asif Khan	SETI-0001	5265

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EXAMINER

PHAM, LONG

ART UNIT PAPER NUMBER

2814

DATE MAILED: 07/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/966,563

Applicant(s)

KHAN ET AL.

Examiner

Long Pham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,7-12 and 20-24 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-2, 7-12, and 20-24 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: .

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-2, 7-12, and 20-24 have been considered but are moot in view of the new ground(s) of rejection.

Rejections and/or objections necessitated by the amendments

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:
The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.
3. Claims 9 and 20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The original specification does not appear to teach applying a quaternary layer of AlInGa_N on another quaternary layer of AlInGa_N.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over McIntosh et al. (US '905).

With respect to claim 1, McIntosh et al. teach a method of producing nitride based heterostructure devices comprising the steps of:

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providing a substrate 15;

applying a ternary layer 12a over the substrate, wherein the ternary layer includes Ga, In, and N; and

applying a quaternary layer 11b on the ternary layer, wherein the quaternary layer includes Ga, Al, N, and In.

McIntosh et al. teach applying a buffer layer 14, a cladding layer 13a, and a barrier layer 11a over the substrate before applying the ternary layer over the substrate but fail to teach applying the ternary layer directly on the substrate.

However, it would have been obvious to ***one of ordinary skill in the art of making semiconductor devices*** to apply the ternary layer directly on the substrate without applying the buffer layer, cladding layer, and barrier layer to eliminate the benefit of presence of the buffer layer, cladding layer, and barrier layer because the removal of a feature, step, or element to thereby eliminate its intended and/or inherent benefits and/or functions has been held to be an obvious expedient. See *Ex parte Wu*, 10 USPQ 2031 (Bd. Pat. App. & Inter. 1989), in re *Larson*, 340 F.2d 965, 144 USPQ 347 (CCPA 1965), and in re *Kuhle*, 526 F.2d 553, 188 USPQ 7 (CCPA 1975).

With respect to claim 2, McIntosh et al. further teach the substrate comprises of sapphire. See col. 5, lines 17-20.

Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over McIntosh et al. (US '905).

With respect to claim 7, McIntosh et al. do not appear to teach the molar fraction of Al in the AlInGaN layer.

However, it would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal range for the molar fraction of Al in the AlInGaN layer through routine experimentation and optimization to obtain optimal or desired device performance because the molar

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fraction of Al in the AlInGaN layer is a result-effective variable and there is no evidence indicating that the molar fraction of Al in the AlInGaN layer is critical or produces any unexpected results and it has been held that it is not inventive to discover the optimum or workable ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP 2144.05.

With respect to claim 8, McIntosh et al. do not appear to teach the molar fraction of In in the AlInGaN layer.

However, it would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal range for the molar fraction of In in the AlInGaN layer through routine experimentation and optimization to obtain optimal or desired device performance because the molar fraction of In in the AlInGaN layer is a result-effective variable and there is no evidence indicating that the molar fraction of In in the AlInGaN layer is critical or produces any unexpected results and it has been held that it is not inventive to discover the optimum or workable ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP 2144.05.

5. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugawara et al. (US '292).

With respect to claim 9, Sugawara et al. teach a method of producing nitride based heterostructure devices comprising the steps of:

- providing a substrate 101;
- applying a buffer layer 102 on the substrate;
- applying a first layer 103 including GaN on the buffer layer;
- applying a second layer or cladding layer 104 on the first layer, wherein the second or cladding layer includes GaN; and

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applying a quaternary layer 105 on the second or cladding layer, wherein the quaternary layer includes AlInGaN.

Sugawara et al. applying the second or cladding layer made of GaN but fail to teach the cladding layer is made of AlGaN.

However, the use of cladding layer made of AlGaN is well-known to ***one of ordinary skill in the art of making semiconductor devices.***

With respect to claim 10, Sugawara et al. further teach the substrate comprises of sapphire. See col. 5, lines 17-20.

6. Claims 11, 12, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugawara et al. (US '905).

With respect to claim 11, Sugawara et al. do not appear to teach the molar fraction of Al in the AlInGaN layer.

However, it would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal range for the molar fraction of Al in the AlInGaN layer through routine experimentation and optimization to obtain optimal or desired device performance because the molar fraction of Al in the AlInGaN layer is a result-effective variable and there is no evidence indicating that the molar fraction of Al in the AlInGaN layer is critical or produces any unexpected results and it has been held that it is not inventive to discover the optimum or workable ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP 2144.05.

With respect to claim 12, Sugawara et al. do not appear to teach the molar fraction of In in the AlInGaN layer.

However, it would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal range for the molar fraction of In in the AlInGaN layer through routine experimentation and optimization to obtain optimal or desired device performance because the molar

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fraction of In in the AlInGaN layer is a result-effective variable and there is no evidence indicating that the molar fraction of In in the AlInGaN layer is critical or produces any unexpected results and it has been held that it is not inventive to discover the optimum or workable ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP 2144.05.

With respect to claim 21, Sugawara et al. do not appear to teach that the buffer layer and first or contact layer include In.

However, the inclusion of In in buffer layer and contact layer is well-known to ***one of ordinary skill in the art of making semiconductor devices***.

7. Claims 22, 23, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over McIntosh et al. (US '905).

With respect to claim 22, McIntosh et al. teach a method of producing nitride based heterostructure devices comprising the steps of:

providing a substrate 15;

providing a buffer layer 14 on the substrate;

applying a ternary layer 12a over the buffer, wherein the ternary layer includes Ga, In, and N; and

applying a quaternary layer 11b on the ternary layer, wherein the quaternary layer includes Ga, Al, N, and In.

McIntosh et al. teach applying a cladding layer 13a and a barrier layer 11a over buffer layer before applying the ternary layer over buffer layer but fail to teach applying the ternary layer directly on the buffer layer.

However, it would have been obvious to ***one of ordinary skill in the art of making semiconductor devices*** to apply the ternary layer directly on the buffer layer without applying the cladding layer and barrier layer to eliminate the benefit of presence of the cladding layer and barrier layer because the removal of a feature,

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step, or element to thereby eliminate its intended and/or inherent benefits and/or functions has been held to be an obvious expedient. See *Ex parte Wu*, 10 USPQ 2031 (Bd. Pat. App. & Inter. 1989), in re *Larson*, 340 F.2d 965, 144 USPQ 347 (CCPA 1965), and in re *Kuhle*, 526 F.2d 553, 188 USPQ 7 (CCPA 1975).

With respect to claim 23, McIntosh et al. further teach buffer layer includes Al and N. See col. 5, lines 17-20.

With respect to claim 24, McIntosh et al. fail to teach the buffer layer further includes In.

However, the inclusion of In to buffer layer is well-known to ***one of ordinary skill in the art of making semiconductor devices.***

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

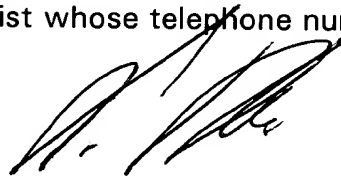
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Long Pham whose telephone number is 703-308-1092. The examiner can normally be reached on M-F, 8:30AM-5:00PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are 703-746-4082 for regular communications and 703-746-4082 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



Long Pham

Primary Examiner

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L. P.

July 23, 2003